WE CLAIM:

1. A method for forming an integrated circuit structure, comprising the steps of:

providing a substrate having a semiconductor surface;

forming an oxygen-containing layer on said semiconductor surface;

forming a uniform nitrogen distribution throughout said oxygen-containing layer; and

re-oxidizing said layer by a rapid anneal step in [an oxidizer and hydrogen] a mixture of N2O and H2 for stabilizing the nitrogen distribution [at minimum oxidation rate], healing plasma-induced damage, and reducing interfacial defect density.

2. The method according to Claim 1 wherein said oxygen-containing layer is an ultra-thin silicon dioxide layer in the thickness range from 0.6 to 2.0 nm.

3. The method according to Claim 1 wherein said oxygen-containing layer is an oxynitride layer.

4. The method according to Claim 1 wherein said step of forming an oxide is a rapid thermal oxidation.

5. The method according to Claim 1 wherein said anneal steps comprise 5 to 60 s at 800 to 1050 °C in N2O/H2, flowing at 1 to 20 standard liters/min at 2 to 50 Torr.

6. The method according to Claim 5 wherein said N2O/H2 mixture contains 0.5 to 30 % (preferred 1 %) H2 with the balance N2O.

7. The method according to Claim 1 wherein said oxidizer and hydrogen mixture comprises NO and H2, or O2 and H2.

8. The method according to Claim 1 wherein said reduced

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1. A method for forming an integrated circuit structure, comprising the steps of:
   providing a substrate having a semiconductor surface;
   forming an oxygen-containing layer on said semiconductor surface;
   forming a uniform nitrogen distribution throughout said oxygen-containing layer; and
   re-oxidizing said layer by a rapid anneal step in a mixture of N2O and H2 for stabilizing the nitrogen distribution, healing plasma-induced damage, and reducing interfacial defect density.
2. The method according to Claim 1 wherein said oxygen-containing layer is an ultra-thin silicon dioxide layer in the thickness range from 0.6 to 2.0 nm.
3. The method according to Claim 1 wherein said oxygen-containing layer is an oxynitride layer.
4. The method according to Claim 1 wherein said step of forming an oxide is a rapid thermal oxidation.
5. The method according to Claim 1 wherein said anneal steps comprise 5 to 60 s at 800 to 1050 °C in N2O/H2, flowing at 1 to 20 standard liters/min at 2 to 50 Torr.
6. The method according to Claim 5 wherein said N2O/H2 mixture contains 0.5 to 30 % (preferred 1 %) H2 with the balance N2O.
7. The method according to Claim 1 wherein said oxidizer and hydrogen mixture comprises NO and H2, or O2 and H2.
8. The method according to Claim 1 wherein said reduced